IMPACT OF CAR FEATURES ON
PRICE AND PROFITABILITY

By Sudhansu

AGENDA

❑ Project Description

❑ Approach

❑ Tech-Stack Used

❑ Insights

❑ Result

Python Jupyter Notebook hyperlink :
    Jupyter Notebook as .ipynb

Link for: Juypyter notebook as pdf

Tableau workbook for visualisations & dashboard hyperlink:
    tableau workbook .twb

link for : tableau workbook as pdf

Project Description

- The **automotive** industry has been **rapidly evolving** over the past few decades with **increasing competition** among manufacturers and a changing consumer landscape. So, Clients **need price optimization** & product development decisions to maximize profitability while meeting consumer demand.

- The **dataset** contains information on various car models and their specifications, and is titled "**Car Features and MSRP**". It was collected and made available on Kaggle by Cooper Union, a private college located in New York City

- The dataset **contains** information on over **11,000 car models** and their specifications, including details on the car's **make**, **model**, **year**, **fuel type**, **engine power**, **transmission**, **wheels**, **number of doors**, **market category**, **size**, **style**, **estimated miles per gallon**, **popularity**, **and** manufacturer's suggested **retail price** (MSRP).

- Using this dataset to **gain insights** into various aspects of the automotive industry

Approach

Downloaded and imported the dataset in Jupyter Notebook, performed data cleaning i.e. removing missing & invalid rows and handling outliers. Used Tableau a visualisation tool to draw graphs and finding insights. And finally drawn conclusions from insights and made recommendations

Tech-Stack Used

- Software: Python 3.10.12, Tableau Desktop 2023.1.0
- Version: Jupyter Notebook 6.4.6
- Purpose: Data cleaning and visualization

I used Jupyter Notebook and Tableau to clean and visualize data because these tools are powerful and versatile. Python is a general-purpose programming language that can be used for a variety of tasks, including data cleaning and visualization. Jupyter Notebook is an interactive environment that makes it easy to write and run Python code.

Insights: Hatchback, Flex Fuel & Diesel is the most popular market category, Crossover & Flex Fuel has the most no. of car models
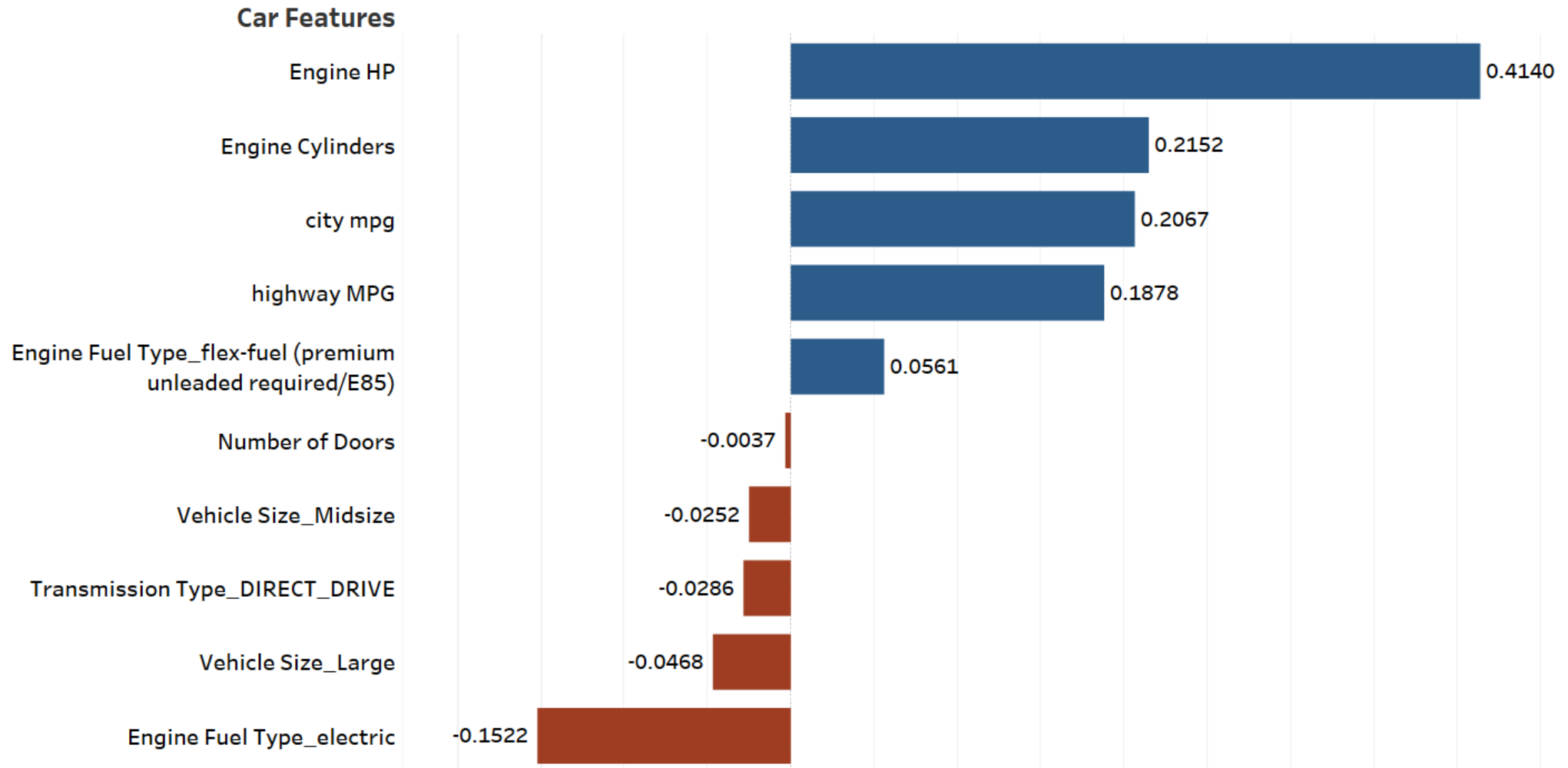

Relationship Between Market Category & Car Model
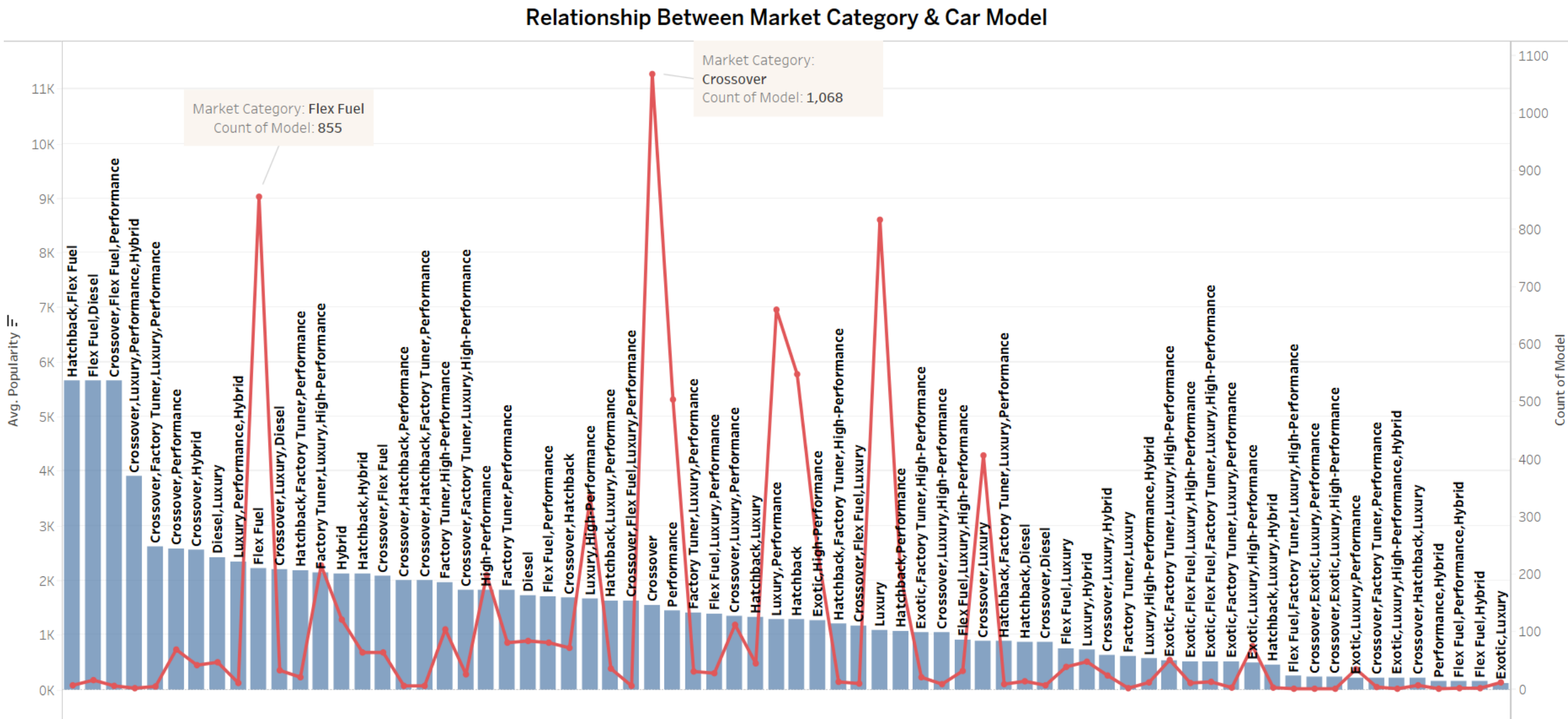
There is a strong positive correlation between Car's Engine Power & Price, Some cars with high engine power and low price are also present

Relation between Car's Engine Power & Price

cars with high enigne power and low price
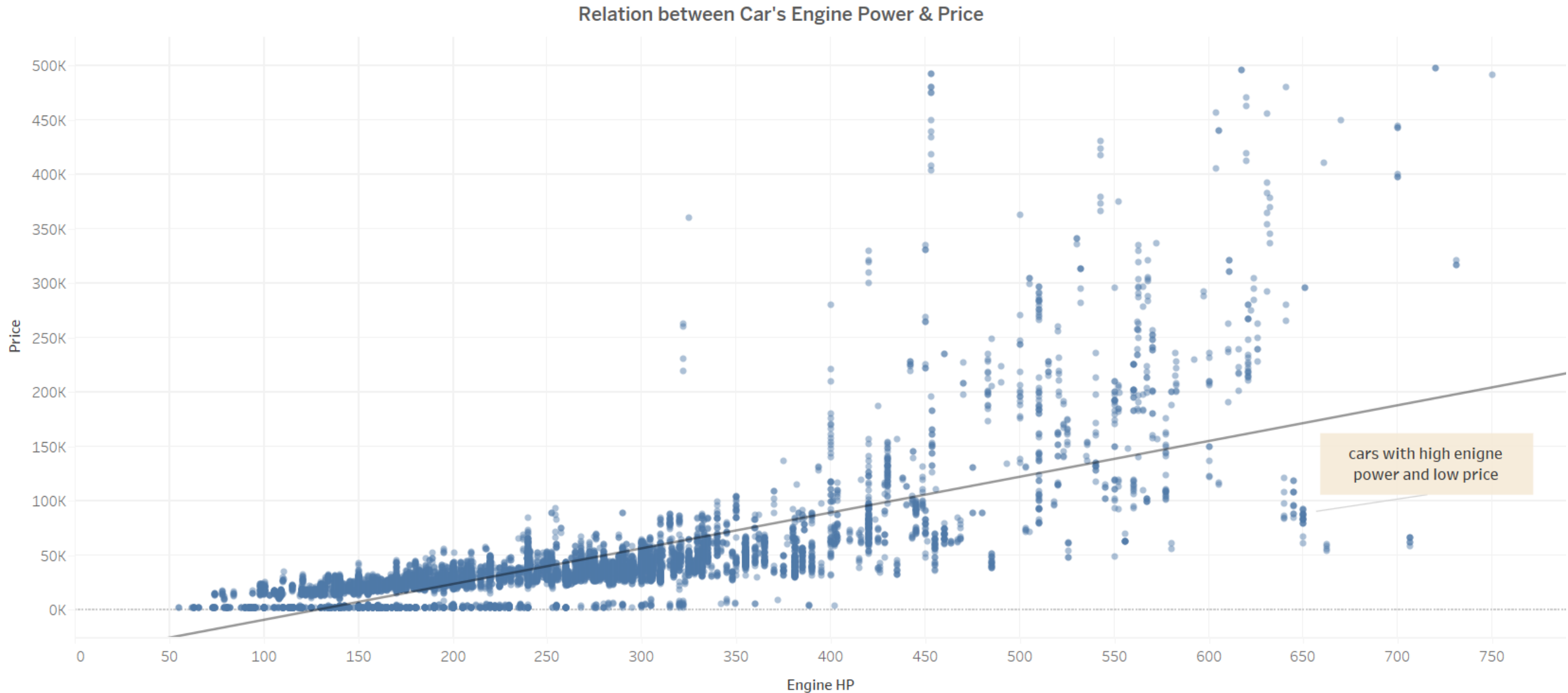
Engine HP & Engine Cylinders have the strongest relationship with car's price, the most important features in determining the car's price

Coefficients from regression model

Car Features

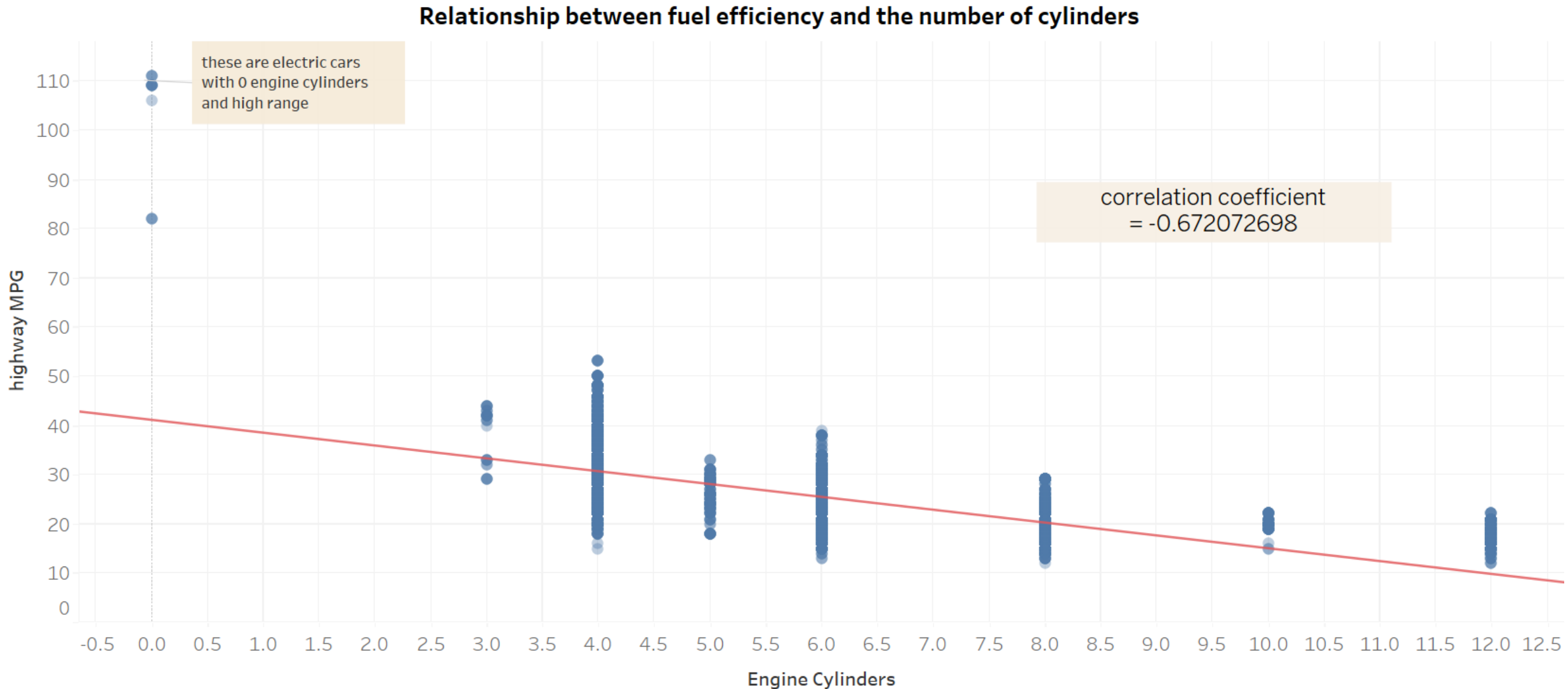| Feature	Coefficient
Engine HP	0.4140
Engine Cylinders	0.2152
city mpg	0.2067
highway MPG	0.1878
Engine Fuel Type_flex-fuel (premium unleaded required/E85)	0.0561
Number of Doors	-0.0037
Vehicle Size_Midsize	-0.0252
Transmission Type_DIRECT_DRIVE	-0.0286
Vehicle Size_Large	-0.0468
Engine Fuel Type_electric	-0.1522

Maybach, Rolls-Royce, Lamborghini are the competitor brands for high budget cars and Plymouth, Oldsmobile, Suzuki for low budget cars

NOTE : very expensive brands like Bugatti are removed from the data which can distort our analysis
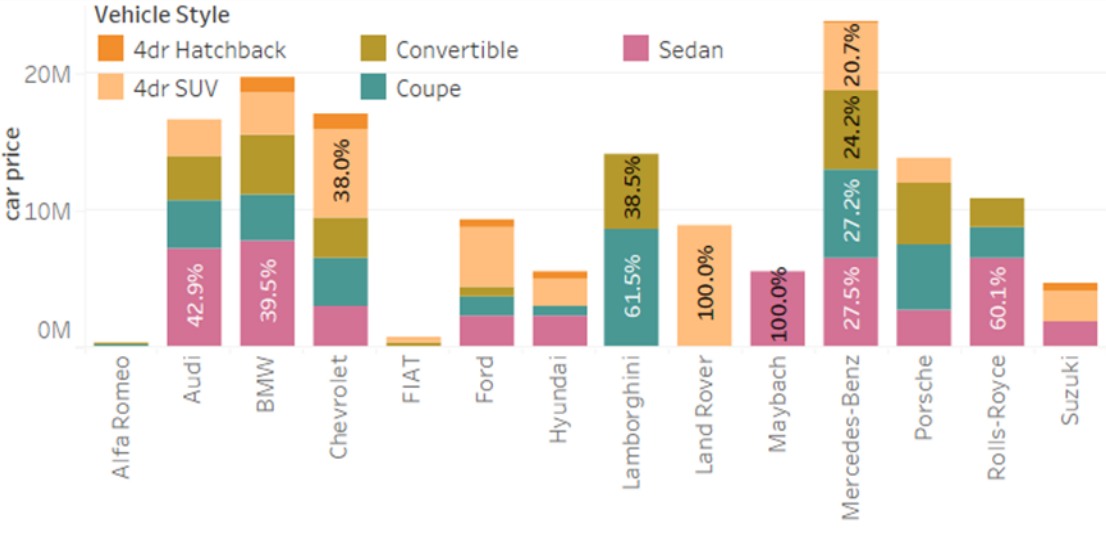

Avg. Car price by Manufacturer
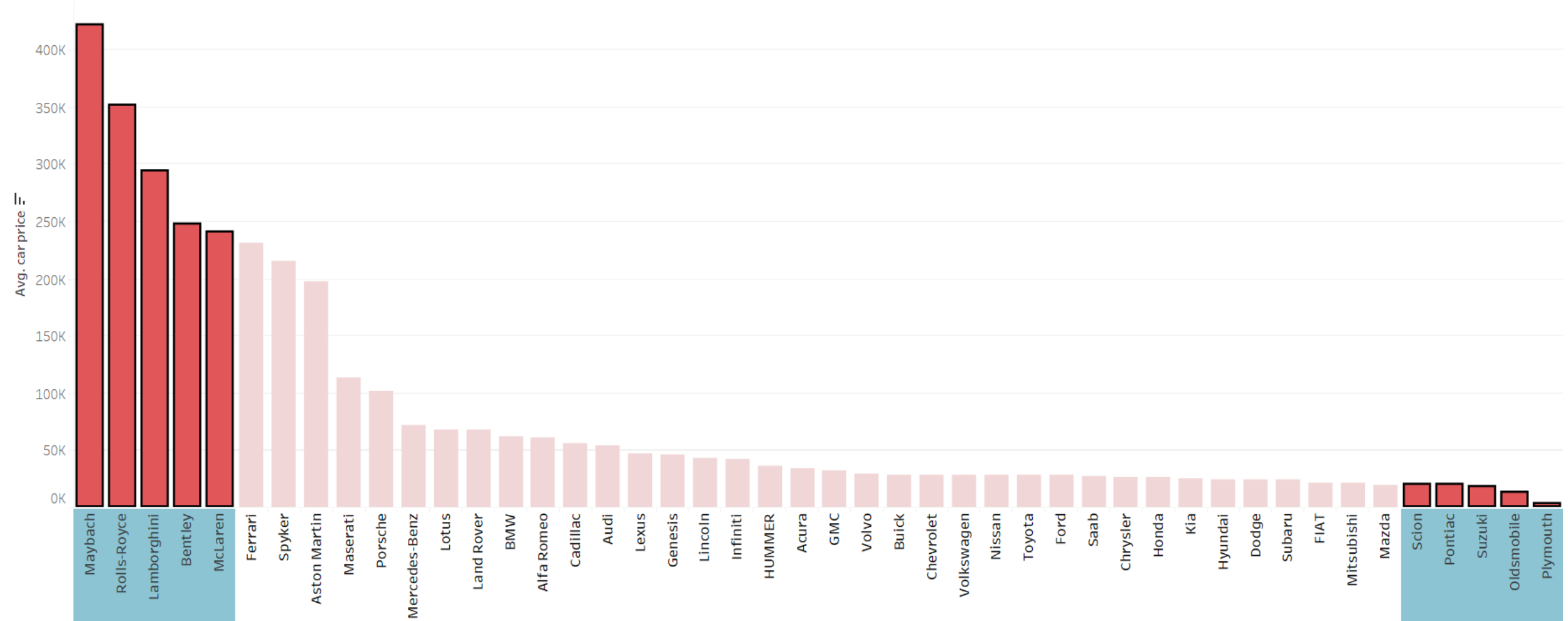
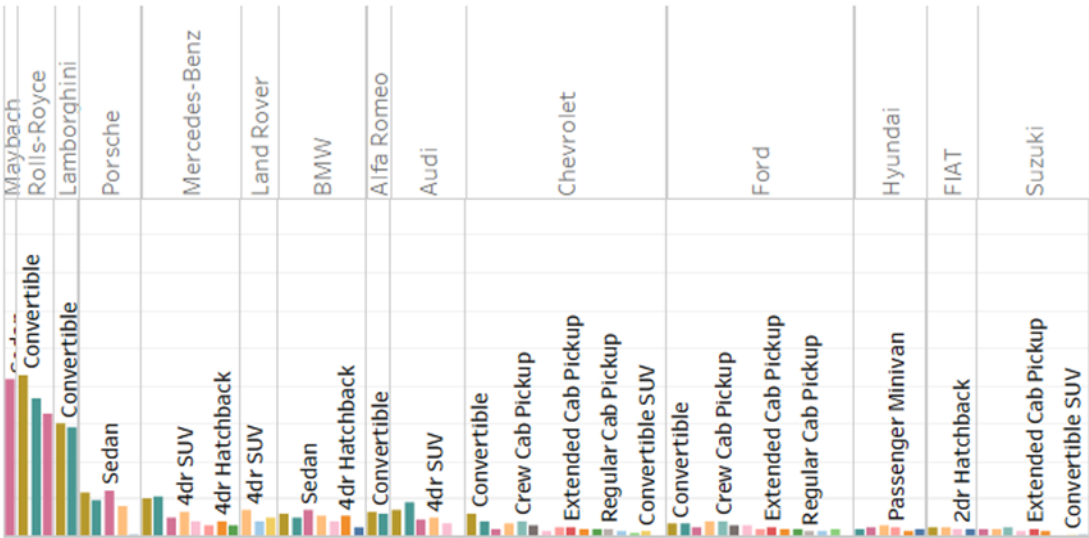# There is a strong negative correlation between no. of Engine cylinders and MPG

Relationship between fuel efficiency and the number of cylinders

these are electric cars with 0 engine cylinders and high range

correlation coefficient = -0.672072698

highway MPG

Engine Cylinders

DASHBOARD: Analyzing the Impact of Car Features on Price
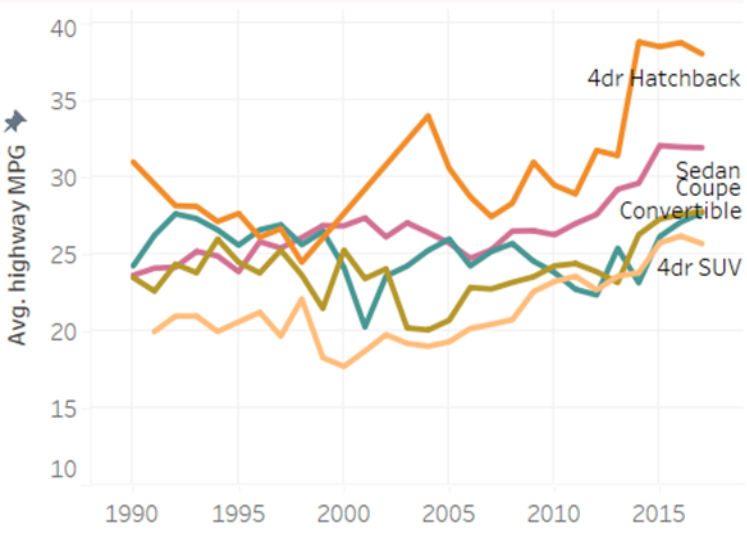
Distribution of car prices vary by brand and body style

Vehicle Style
- 4dr Hatchback
- 4dr SUV
- Convertible
- Coupe
- Sedan

Avg. MSRPs across different car brands and body styles

Vehicle Style
- [ ] 2dr Hatchback
- [ ] 2dr SUV
- [✓] 4dr Hatchback
- [✓] 4dr SUV
- [ ] Cargo Minivan
- [ ] Cargo Van
- [✓] Convertible
- [ ] Convertible SUV
- [✓] Coupe
- [ ] Crew Cab Pickup
- [ ] Extended Cab Pickup
- [ ] Passenger Minivan
- [ ] Passenger Van
- [ ] Regular Cab Pickup
- [✓] Sedan
- [ ] Wagon

relationship between MSRP and transmission type, with different symbols for each body style

- ○ 4dr Hatchback
- □ 4dr SUV
- △ Convertible
- + Coupe
- ◇ Sedan
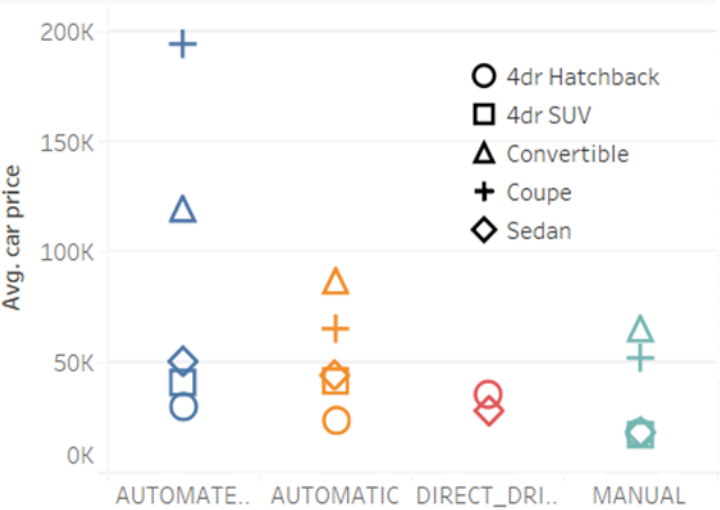
trend of fuel efficiency (MPG) over time for each body style

relationship between horsepower, MPG, and price across different car brands

car brand
- [ ] Acura
- [✓] Alfa Romeo
- [ ] Aston Martin
- [✓] Audi
- [ ] Bentley
- [✓] BMW
- [ ] Buick
- [ ] Cadillac
- [✓] Chevrolet
- [ ] Chrysler
- [ ] Dodge
- [ ] Ferrari
- [✓] FIAT
- [✓] Ford
- [ ] Genesis
- [ ] GMC
- [ ] Honda
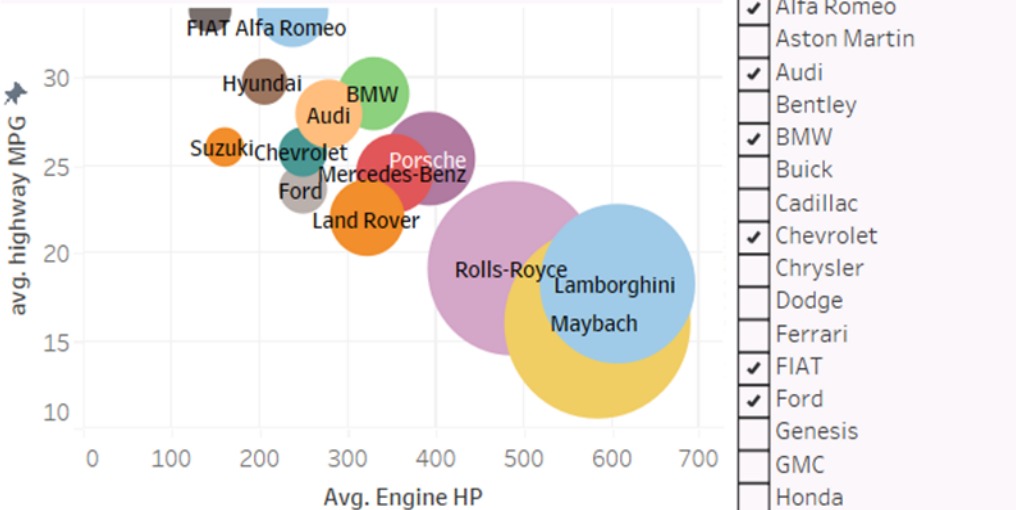
Results

❑ Conclusions and recommendations :

➢ Cars with **200 HP engine** or below are **priced** below **$50k**, **500-600 HP** cars are **around $100k** and can go above also. Company should optimize price accordingly

➢ Engine power and **cylinder** are most **important** feature in **determining** car's price

➢ Cars with **automated_manual** and **automatic transmission type** are **high** priced

➢ There is a **trade off** between **engine power** and **efficiency**, more HP engine results in lower efficiency and high price

➢ **Hatchback**, **Flex Fuel & Diesel and crossover** market category is in **high demand** among people

➢ **Trend** of fuel efficient **4dr Hatchback** and **Sedan** has **grown** over the years

Thank you